

The apparatus according to claim 1, further comprising: voice data processing means for providing audio data, which has entered from the general-purpose terminal and which has been 5 converted by said converting means, to the communication terminals, and providing audio data, which has entered from the communication terminals and which has been converted by said converting means, to the general-purpose terminal.

10 [Claim 3]

The apparatus according to claim 1 or 2, wherein said audio data converting means converts a voice communication protocol.

[Claim 4]

15 The apparatus according to claim 4, wherein the voice communication protocol that corresponds to the general-purpose terminal makes real-time communication possible.

[Claim 5]

20 The apparatus according to claim 4, wherein the voice communication protocol that corresponds to the general-purpose terminal is the Internet Protocol.

[Claim 6]

25 The apparatus according to claim 5, wherein the voice communication protocol that corresponds to the general-purpose terminal is the Real-Time Transfer Protocol in the Internet Protocol.

[Claim 7]

A data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising:

5 connecting means for connecting a general-purpose terminal;

image data generating means for generating image data that is provided and conforms to the general-purpose terminal;

10 image data providing means for providing the image data, which has been generated by said image data generating means, to the general-purpose terminal via said connecting means;

15 voice recognition means for recognizing voice data that has entered from the communication terminals and generating text data based upon this recognition; and

data distributing means for distributing the text data in real-time.

20 [Claim 8]

The apparatus according to claim 7, wherein said data distributing means distributes the text data that has entered from the general-purpose terminals in real-time.

25 [Claim 9]

The apparatus according to claim 8, wherein
said voice recognition means generates text-chat
data.

[Claim 10]

5 The apparatus according to claim 9, wherein the
communication terminals have a data conferencing
function based upon the text-chat data.

[Claim 11]

A data communication control apparatus for
10 controlling data communication among a plurality of
connected communication terminals, comprising:

 connecting means for connecting a general-
purpose terminal;

 image data generating means for generating
15 image data that is provided to the general-purpose
terminal;

 image data providing means for providing the
image data, which has been generated by said image
data generating means, to the general-purpose
20 terminal via said connecting means;

 voice recognition means for recognizing first
voice data that has entered from the communication
terminals and generating text data based upon this
recognition;

25 text data distributing means for distributing
the text data to the general-purpose terminal in
real-time;

voice synthesizing means for synthesizing
second voice data based upon text data that has
entered from the general-purpose terminal; and
audio data distributing means for distributing
5 the second voice data to the communication
terminals.

[Claim 12]

The apparatus according to any one of claims 7
to 11, wherein the general-purpose terminal has a
10 data conferencing function based upon the text-chat
data.

[Claim 13]

The apparatus according to claim 12, wherein
the text-chat data is in compliance with ITU-T
15 Recommendation T.120.

[Claim 14]

The apparatus according to any one of claims 1
to 13, wherein said connecting means connects the
general-purpose terminal by the Internet Protocol.

20 [Claim 15]

The apparatus according to any one of claims 1
to 14, wherein said image data generating means
generates hypertext data.

[Claim 16]

25 The apparatus according to claim 15, wherein
said image data generating means generates hypertext

data based upon image data that has entered from the communication terminals.

[Claim 17]

The apparatus according to claim 16, wherein
5 said image data generating means generates HTML-format image data.

[Claim 18]

The apparatus according to any one of claims 1 to 17, wherein said image data providing means is an
10 HTTP server.

[Claim 19]

The apparatus according to any one of claims 1 to 18, wherein said general-purpose terminal internally incorporates a WWW browser.

15 [Claim 20]

The apparatus according to any one of claims 1 to 19, wherein said communication terminals are dedicated videoconferencing terminals in compliance with any of ITU-T Recommendations H.320, H.323 and
20 H.324.

[Claim 21]

The apparatus according to claim 20, wherein the data communication apparatus is in compliance with ITU-T Recommendations H.231 and H.243.

25 [Claim 22]

The apparatus according to any one of claims 1 to 20, wherein said image data generating means

comprises means for generating still-picture data from moving-picture data.

[Claim 23]

The apparatus according to claim 22, wherein
5 said image data generating means generates still-picture data based upon a command from the general-purpose terminal.

[Claim 24]

A control method in a data communication
10 control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, comprising:

an image data generating step of generating image data that is provided and conforms to the
15 general-purpose terminal;

an image data providing step of providing the image data, which has been generated at said image data generating step, to the general-purpose terminal;

20 a first converting step of converting audio data that has entered from the general-purpose terminal and providing the audio data to the communication terminal; and

a second converting step of converting audio
25 data that has entered from the communication terminal and providing the audio data to the general-purpose terminal.

[Claim 25]

A control method in a data communication control apparatus for controlling data communication between a connected communication terminal and 5 general-purpose terminal, comprising:

an image data generating step of generating image data that is provided and conforms to the general-purpose terminal;

10 an image data providing step of providing the image data, which has been generated at said image generating step, to the general-purpose terminal;

15 a voice recognition step of recognizing voice data that has entered from the communication terminal and generating text data based upon this recognition; and

a data distributing step of distributing the text data in real-time.

[Claim 26]

A control method in a data communication control apparatus for controlling data communication between a connected communication terminal and 20 general-purpose terminal, comprising:

25 an image data generating step of generating image data that is provided and conforms to the general-purpose terminal;

an image data providing step of providing the image data, which has been generated at said image generating step, to the general-purpose terminal;

5 a voice recognition step of recognizing first voice data that has entered from the communication terminal and generating text data based upon this recognition;

10 a text data distributing step of distributing the text data to the general-purpose terminal in real-time;

 a voice synthesizing step of synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and

15 an audio data distributing step of distributing the second voice data to the communication terminal.

[Claim 27]

A data communication system in which a plurality of communication terminals are connected via a data communication control apparatus and data communication is performed among said plurality of communication terminals, wherein said data communication control apparatus comprises:

 connecting means for connecting a general-purpose terminal;

25 image data generating means for generating image data that is provided and conforms to the general-purpose terminal;

image data providing means for providing the image data, which has been generated by said image generating means, to the general-purpose terminal via said connecting means; and

5 audio data converting means for converting audio data in order that the audio data may be communicated mutually between the general-purpose terminal and the plurality of communication terminals.

10 [Claim 28]

A data communication system in which a plurality of communication terminals are connected via a data communication control apparatus and data communication is performed among said plurality of 15 communication terminals, wherein said data communication control apparatus comprises:

connecting means for connecting a general-purpose terminal;

image data generating means for generating 20 image data that is provided and conforms to the general-purpose terminal;

image data providing means for providing the image data, which has been generated by said image data generating means, to the general-purpose 25 terminal via said connecting means;

voice recognition means for recognizing voice data that has entered from the communication

terminals and generating text data based upon this recognition; and

data distributing means for distributing the text data in real-time.

5 [Claim 29]

A data communication system in which a plurality of communication terminals are connected via a data communication control apparatus and data communication is performed among said plurality of 10 communication terminals, wherein said data communication control apparatus comprises:

connecting means for connecting a general-purpose terminal;

15 image data generating means for generating image data that is provided and conforms to the general-purpose terminal;

image data providing means for providing the image data, which has been generated by said image data generating means, to the general-purpose 20 terminal via said connecting means;

voice recognition means for recognizing first voice data that has entered from the communication terminals and generating text data based upon this recognition;

25 data distributing means for distributing the text data to the general-purpose terminal in real-time;

voice synthesizing means for synthesizing second voice data based upon text data that has entered from the general-purpose terminal; and audio data processing means for distributing 5 the second voice data to the communication terminals.

[Claim 30]

A recording medium on which has been recorded program code of a control method in a data 10 communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, said program code comprising:

code of an image data generating step of 15 generating image data that is provided and conforms to the general-purpose terminal;

code of an image data providing step of providing the image data, which has been generated at said image data generating step, to the general- 20 purpose terminal;

code of a first converting step of converting audio data that has entered from the general-purpose terminal and providing the audio data to the communication terminal; and

25 code of a second converting step of converting audio data that has entered from the communication

terminal and providing the audio data to the general-purpose terminal.

[Claim 31]

A recording medium on which has been recorded
5 program code of a control method in a data communication control apparatus for controlling data communication between a connected communication terminal and general-purpose terminal, said program code comprising:

10 code of an image data generating step of generating image data that is provided and conforms to the general-purpose terminal;

code of an image data providing step of providing the image data, which has been generated
15 at said image data generating step, to the general-purpose terminal;

code of a voice recognition step of recognizing voice data that has entered from the communication terminal and generating text data based upon this
20 recognition; and

code of a data distributing step of distributing the text data in real-time.

[Claim 32]

A recording medium on which has been recorded
25 program code of a control method in a data communication control apparatus for controlling data communication between a connected communication

terminal and general-purpose terminal, said program code comprising:

code of an image data generating step of generating image data that is provided and conforms
5 to the general-purpose terminal;

code of an image data providing step of providing the image data, which has been generated at said image data generating step, to the general-purpose terminal;

10 code of a voice recognition step of recognizing first voice data that has entered from the communication terminal and generating text data based upon this recognition;

15 code of a text data distributing step of distributing the text data to the general-purpose terminal in real-time;

code of a voice synthesizing step of synthesizing second voice data based upon text data that has entered from the general-purpose terminal;

20 and

code of an audio data distributing step of distributing the second voice data to the communication terminal.

[DETAILED DESCRIPTION OF THE INVENTION]

25 [0001]

[TECHNICAL FIELD OF THE INVENTION]

This invention relates to a data communication control apparatus and method, and a data communication system. This invention, for example, relates to a data communication control apparatus and method, and a data communication system for implementing a multipoint videoconferencing system communicates video images and audio signals.

[0002]

[PRIOR ART]

10 Multipoint videoconferencing systems that are currently proliferating make it possible for videoconferencing terminals in compliance with the standard of ITU-T Recommendation H.320 to communicate with one another from multiple
15 locations.

[0003]

ITU-T Recommendation H.231, which defines the functional framework of multipoint connection devices and the form of multipoint communications, 20 and ITU-T Recommendation H.243, which establishes an in-channel communications procedure, have been set up as standards relating to multipoint connection equipment for controlling the connections at the multiple locations of videoconferencing terminals.

25 [0004]

Fig. 2 is a block diagram illustrating the configuration of a multipoint videoconferencing

system according to the prior art. As shown in Fig. 2, the multipoint connection apparatus 122 interconnects the videoconferencing terminals 121 located at three or more points and supervises audio 5 mixing, distribution of video data or multiple-screen synthesis of video data and chairperson control for facilitating conferencing. Thus, if the videoconferencing terminals are in compliance with H.320, a multipoint video conference connecting a 10 plurality of remote locations can be realized by connecting the terminals via the multipoint connection apparatus.

[0005]

However, an H.320-compliant videoconferencing 15 terminal is very expensive because it is a dedicated terminal that necessitates high-load signal processing such as the compression and decompression of video data (ITU-T Recommendations H.261, H.263, etc.). Accordingly, it is difficult to realize a 20 low-cost, low-power-consumption terminal that is capable of participating in videoconferencing, and to make such a terminal portable.

[0006]

In order to solve this problem, it has been 25 proposed to provide the conventional multipoint connection apparatus not only with the function for interconnecting H.320-compliant videoconferencing

terminals but also with a so-called voice gateway function that makes possible participation in a multipoint videoconferencing system by ordinary telephone. Fig. 3 is a block diagram showing the 5 configuration of a multipoint videoconferencing equipped with a telephone-based voice gateway function. As shown in Fig. 3, a plurality of dedicated videoconferencing terminals 131 and an ordinary telephone 133 are connected by a multipoint 10 connection apparatus 132. In this system it is possible for the ordinary telephone 133 to participate in a multipoint video conference by voice only.

[0007]

15 [PROBLEMS OF THAT THE INVENTION IS TO SOLVE]

In a multipoint videoconferencing system as mentioned above, it is possible to participate in a conference from an ordinary telephone but a sufficiently realistic sense of conference 20 participation is not obtained merely by telephone-based voice. In addition, naturally it is impossible to participate in data conferencing in accordance with ITU-T Recommendation T.120.

[0008]

25 Accordingly, it is an object of the present invention to provide a data communication control apparatus and method, as well as a data

communication system, in which participation easily in a multipoint video conference by voice is possible from a general-purpose network terminal.

[0009]

5 [MEANS OF SOLVING THE PROBLEMS]

To solve the above-described problems, a data communication control apparatus according to the present invention has the following characteristics.

[0010]

10 The present invention is directed to a data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising: connecting means for connecting a general-purpose terminal;
15 image data generating means for generating image data that is provided and conforms to the general-purpose terminal; image data providing means for providing the image data, which has been generated by said image data generating means, to the general-
20 purpose terminal via said connecting means; and audio data converting means for converting audio data in order that the audio data may be communicated mutually between the general-purpose terminal and the plurality of communication
25 terminals.

[0011]

Furthermore, the present invention is directed to a data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising:

5 connecting means for connecting a general-purpose terminal; image data generating means for generating image data that is provided and conforms to the general-purpose terminal; image data providing means for providing the image data, which has been

10 generated by said image data generating means, to the general-purpose terminal via said connecting means; voice recognition means for recognizing voice data that has entered from the communication terminals and generating text data based upon this

15 recognition; and data distributing means for distributing the text data in real-time.

[0012]

Furthermore, the present invention is directed to a data communication control apparatus for controlling data communication among a plurality of connected communication terminals, comprising:

20 connecting means for connecting a general-purpose terminal; image data generating means for generating image data that is provided to the general-purpose terminal; image data providing means for providing the image data, which has been generated by said image data generating means, to the general-purpose

terminal via said connecting means; voice
recognition means for recognizing first voice data
that has entered from the communication terminals
and generating text data based upon this
5 recognition; text data distributing means for
distributing the text data to the general-purpose
terminal in real-time; voice synthesizing means for
synthesizing second voice data based upon text data
that has entered from the general-purpose terminal;
10 and audio data distributing means for distributing
the second voice data to the communication
terminals.

[0013]

[DESCRIPTION OF THE PREFERRED EMBODIMENTS]

15 Preferred embodiments of the present invention
will now be described in detail in accordance with
the accompanying drawings.

[0014]

<First Embodiment>

20 Fig. 4 is a block diagram illustrating the
basic configuration of a multipoint
videoconferencing system according to a first
embodiment of the present invention. As shown in
Fig. 4, the system includes dedicated
25 videoconferencing terminals 41a to 41d, which are
terminals in compliance with the standards relating
to videoconferencing stipulated by ITU-T

Recommendations H.320, H.323 and H.324, etc., a videoconferencing multipoint connection apparatus 42 which, in addition to the functions relating to a conventional multipoint connection apparatus, also

5 has a function for automatically generating HTML (HyperText Markup Language) data and an HTTP (HyperText Transfer Protocol) server function. The system further includes general-purpose communication terminals 43a, 43b. Data such as

10 video and audio that has been stored in the HTTP server within the multipoint connection apparatus 42 can be displayed or converted to sound by the general-purpose communication terminals 43a, 43b.

Personal computers or network computers

15 incorporating a so-called WWW browser are applicable as the general-purpose communication terminals 43a, 43b. Recent progress in semiconductor technologies also makes it possible to use simpler transportable terminals. Lines 44a to 44f connect the terminals

20 to the multipoint connection apparatus 42. A public network such as an ISDN or PSTN and a LAN (Local Area Network) such as the Ethernet are applicable.

It is assumed here that the general-purpose communication terminals 43a, 43b are connected to

25 the multipoint connection apparatus 42 via the lines 44e, 44f, respectively, in accordance with the IP (Internet Protocol).

[0015]

Thus, in this embodiment, the already existing videoconferencing terminals 41a to 41d and the general-purpose communication terminals 43a, 43b such as personal computers or network computers are interconnected by simple means.

[0016]

Fig. 1 is a block diagram showing the details of the multipoint connection apparatus 42 according to this embodiment. As shown in Fig. 1, the apparatus includes network interface units 11a to 11c through which the videoconferencing terminals 41a to 41d are accommodated in this system. These units supervise line interfaces of an ISDN or PSTN, etc. Multiplexer/demultiplexers 12a to 12c apply multiplex/demultiplex processing to various data relating to images, voice and control, etc. The multiplexer/demultiplexers 12a to 12c are in compliance with H.221, by way of example. The number of network interfaces and multiplexer/demultiplexers in the multipoint connection apparatus 42 correspond to the number of dedicated videoconferencing terminals capable of being connected to the multipoint connection apparatus 42. An audio processor 13 applies decoding/mixing processing to audio code data from the dedicated videoconferencing terminals 41a to

41d, thenceforth encodes the data again and distributes it to each of the dedicated videoconferencing terminals 41a to 41d and to a voice-communication protocol converter 21.

5 [0017]

The voice-communication protocol converter 21 performs mutual conversion of encoding methods and protocols in order to realize mutual communication of audio data among the videoconferencing terminals 10 41a - 41d and general-purpose communication terminals 43a, 43b connected to the multipoint connection apparatus 42. An image switching unit 14 selectively switches among image signals, which are distributed to the dedicated videoconferencing terminals 41a to 41d, in accordance with a control signal issued by a chairperson terminal, by way of example. A data distribution unit 15 executes processing for distributing T.120-compliant data conferencing data, etc. A system controller 16 carries out overall control of the system. An image converter 17 generates still pictures by decompressing moving-picture code data that has been demultiplexed by the multiplexer/demultiplexers 12a to 12c.

25 [0018]

An HTML data generator 18 converts, to HTML files, still pictures generated by the image

converter 17 and various information relating to videoconferencing in this system. An HTTP server 19 provides various videoconferencing information generated by the HTML data generator 18 to the 5 general-purpose communication terminals 43a, 43b connected to the multipoint connection apparatus 42. Network interface unit 20 is for connecting general-purpose terminals. The network interface unit supervises an interface of a public network, such an 10 ISDN or PSTN, etc., or an interface of a LAN such as the Ethernet.

[0019]

The operation in the videoconferencing system of this embodiment will be described in detail with 15 reference to Fig. 1.

[0020]

Multimedia multiplexed data that has been sent via the dedicated network interfaces 11a to 11c accommodating the videoconferencing terminals 41a to 20 41d is demultiplexed to audio code data, video code data and low-speed data for data conferencing by the multiplexer/demultiplexers 12a to 12c. The demultiplexed audio code data is decoded by the audio processor 13 and mixed with data obtained by 25 decoding other audio code data that has been demultiplexed by any of the multiplexer/demultiplexers 12a to 12c. It should be

noted that audio code data enters also from the general-purpose communication terminals 43a, 43b via the network interfaces 20a, 20b. This audio code data is subjected to a protocol conversion by the
5 voice-communication protocol converter 21 so as to conform to the videoconferencing terminals 41a to 41d. The audio processor 13 decodes the protocol-converted audio code data from the general-purpose terminals 43a, 43b, mixes this data with decoded
10 data obtained by decoding the audio code data from the videoconferencing terminals 41a to 41d.

[0021]

The mixed audio code data is multiplexed with image data in the multiplexer/demultiplexers 12a -
15 12c and the multiplexed data is distributed to the dedicated videoconferencing terminals 41a - 41d. At the same time, the mixed audio code data is converted to a prescribed protocol by the voice-communication protocol converter 21, after which the
20 resulting data is sent to the general-purpose terminals 43a, 43b via the network interfaces 20a, 20b. Mutual communication of audio data is performed between the general-purpose communication terminals 43a, 43b and the multipoint connection
25 apparatus 42 by RTP (Real-Time Transfer Protocol) of the IP. That is, the voice-communication protocol converter 21 performs a mutual conversion between

the Internet protocol and the videoconferencing protocol in relation to the audio data.

[0022]

Among the various items of video code data
5 demultiplexed by the multiplexer/demultiplexers 12a to 12c, the video code data from a terminal designated by the image switching unit 14 is sent to the multiplexer/demultiplexers 12a to 12c, whence the data is distributed to the videoconferencing 10 terminals 41a to 41d. The video code data demultiplexed by the multiplexer/demultiplexers 12a to 12c is sent also to the image converter 17 at the same time. The image converter 17 decodes the coded video data and converts one frame of video data to a 15 still picture. The still picture obtained by the conversion is compressed by an encoding method stipulated by the JPEG (Joint Photographic Experts Group), by way of example.

[0023]

20 The HTML data generator 18 generates HTML data based upon the still picture from each terminal generated by the image converter 17 and information relating to videoconferencing. Fig. 5 illustrates the manner in which HTML files generated by the HTML 25 data generator 18 are perused by an HTML viewer. As shown in Fig. 3, a window 51 indicates information relating to a videoconference. By way of example,

the window 51 presents conference starting time and information relating to participants. Windows 52a to 52e display still pictures generated by the image converter 17, e.g., still pictures of the 5 participants taking part in the conference by each of the terminals. A window 53 is for T.120-compliant data conferencing. This window displays text chat, shared applications, etc.

[0024]

10 As shown in Fig. 4, the HTTP server 19 provides the HTML data generated by the HTML data generator 18 to the general-purpose communication terminals 43a, 43b, which possess an HTML viewer function, connected to the network interfaces 20a, 20b.

15 [0025]

Thus, in accordance with this embodiment, as described above, the user of a general-purpose terminal connected to a network interface via a network is enabled, by an IP-related protocol such 20 as RTP, to perform voice communication with other dedicated videoconferencing terminals and is also enabled to peruse video from a dedicated videoconferencing terminal as a still picture by utilizing an HTML viewer.

25 [0026]

Further, an ordinary personal computer or network computer having an audio input/output

function can be employed as the general-purpose terminal that implements the above functions. As a result, a person can participate in a conventional multipoint video conference from any location via an ordinary telephone line and it also becomes readily feasible to participate in a conference from a transportable terminal.

[0027]

<Second Embodiment>

10 A second embodiment according to the present invention will now be described.

[0028]

Since the basic configuration of the videoconferencing system according to the second embodiment is similar to that shown in Fig. 4, which illustrates the first embodiment, it need not be described again here. The multipoint connection apparatus 42 according to the second embodiment, besides having the functions relating to the conventional multipoint connection apparatus, is provided not only with the function for automatically generating HTML data and the HTTP server function but also with a function through which the content of a conversion with a person speaking at a conference is converted to text by a voice recognition mechanism.

[0029]

Fig. 6 is block diagram showing the details of the multipoint connection apparatus 42 according to the second embodiment. Components in Fig. 6 identical with those of the first embodiment 5 illustrated in Fig. 1 are designated by like reference characters and are not described again.

[0030]

In Fig. 6, the audio processor 13 applies decoding/mixing processing to audio code data from 10 the dedicated videoconferencing terminals 41a to 41d, thenceforth encodes the data again and distributes it to each of the dedicated videoconferencing terminals 41a to 41d and to a voice recognition unit 22. The latter subjects the 15 audio data, which has been mixed by the audio processor 13, to recognition processing.

[0031]

The operation of the videoconferencing system according to the second embodiment will be described 20 in detail with reference to the system configuration shown in Fig. 6. Operational aspects similar to those of the first embodiment need not be described in detail again.

[0032]

25 Multiplexed multimedia data that has been sent via the network interfaces 11a to 11c accommodating the dedicated videoconferencing terminals 41a to 41d

is demultiplexed to audio code data, video code data and low-speed data for data conferencing by the multiplexer/demultiplexers 12a to 12c.

[0033]

5 The demultiplexed audio code data is decoded by the audio processor 13 and mixed with data obtained by decoding other audio code data that has been demultiplexed by any of the multiplexer/demultiplexers 12a to 12c. The mixed
10 audio code data is coded further, after which the resulting data is multiplexed with image data in the multiplexer/demultiplexers 12a to 12c and then distributed to the dedicated videoconferencing terminals 41a to 41d. At the same time, the audio
15 data that has been mixed by the audio processor 13 is sent to the voice recognition unit 22.

[0034]

The voice recognition unit 22 subjects the input audio data to recognition processing and
20 converts the obtained results to text data. The text data generated is distributed to the general-purpose terminals 43a, 43b as text-chat data in a data conferencing function in compliance with T.120, by way of example. It should be noted that the data
25 conferencing function mentioned here is one through which mutual communication of text-chat data is performed between the multipoint connection

apparatus 42 and the general-purpose terminals 43a, 43b connected to the network interfaces 20a, 20b. Accordingly, text data that has entered from the general-purpose terminals 43a, 43b also is displayed
5 in the text-chat window of the dedicated videoconferencing terminals 41a to 41d. The data distribution unit 15 supervises distribution processing relating to this data communication.

[0035]

10 Meanwhile, in a manner similar to that of the first embodiment, video code data that has been demultiplexed by the multiplexer/demultiplexers 12a to 12c is decoded by the image converter 17 and converted to HTML data by the HTML data generator 18
15 so that it can be viewed in the manner shown in Fig. 5. In Fig. 5, the window 53 for data conferencing compliant with T.120, etc., displays, in the form of text chat, text data obtained in the voice recognition unit 22 based upon voice data that has
20 entered from the dedicated videoconferencing terminals 41a to 41d. An example of the text chat is the content of remarks made by participants at a conference. The users of the general-purpose terminals 43a, 43b are capable of entering their own
25 remarks at a conference in the form of text displayed in the window 53. Entered text data is distributed to the dedicated videoconferencing

terminals 41a to 41d. More specifically, the users of the general-purpose terminals 43a, 43b are capable of mutual text-based communication with the users of the dedicated videoconferencing terminals 5 41a to 41d by way of the text-chat function.

[0036]

Thus, in accordance with this embodiment, as described above, the user of a general-purpose terminal connected to a network interface via a 10 network is capable of performing text-data-based mutual communication with a dedicated videoconferencing terminal by utilizing a text-chat function. Furthermore, video from a dedicated videoconferencing terminal can be viewed as a still 15 picture by utilizing an HTML viewer.

[0037]

In addition, a personal computer or network computer having a comparatively handy functional architecture that does not include a multimedia 20 function can be used as the general-purpose terminal for implementing the above-mentioned functions. As a result, participation in a multipoint videoconference from any location and from a transportable terminal is made easier.

25 [0038]

<Third Embodiment>

A third embodiment according to the present invention will now be described.

[0039]

Since the basic configuration of the
5 videoconferencing system according to the third
embodiment is similar to that shown in Fig. 1, which
illustrates the first embodiment, it need not be
described again here. The multipoint connection
apparatus 42 according to the third embodiment has a
10 voice synthesizing function in addition to the
function for converting the content of remarks to
text by the voice recognition mechanism described in
the second embodiment.

[0040]

15 Fig. 7 is block diagram showing the details of
the multipoint connection apparatus 42 according to
the third embodiment. Components in Fig. 7
identical with those of the second embodiment
illustrated in Fig. 6 are designated by like
20 reference characters and are not described again.

[0041]

In Fig. 7, a voice synthesizer 23, the input to
which is text data sent from the general-purpose
terminals 43a, 43b connected to the network
25 interfaces 20a, 20b, executes voice synthesizing
processing for converting the content of the text
data to voice data. The synthesized voice data is

mixed by the audio processor 13 with voice data that has been sent from the dedicated videoconferencing terminals 41a to 41d and the resulting data is distributed to the appropriate dedicated
5 videoconferencing terminals 41a to 41d again. As a result, text-chat data from conference participants using the general-purpose terminals 43a, 43b can be heard as voice information by the conference participants using the dedicated videoconferencing
10 terminals 41a to 41d.

[0042]

Thus, in accordance with the third embodiment, as described above, even if a dedicated videoconferencing terminal does not possess a data conferencing function such as a text-chat function, mutual communication with a general-purpose terminal connected to the videoconferencing system can be realized by synthesized voice.
15

[0043]

20 In each of the embodiments described above, it is explained that still-picture generation in the image converter 17 is performed at an arbitrary timing. However, it is also possible to start the conversion processing in response to commands from
25 the general-purpose terminals 43a, 43b, by way of example. In such case the users of the general-purpose terminals 43a, 43b select the image windows

52a to 52e updated on the HTML browser, and the
image converter 17 starts the conversion of the
image and re-generates the still-picture data in
response to an image request signal that conforms to
5 the selection made, whereby the window display is
updated. By thus generating a still picture, which
is displayed in a window, in accordance with a
timing designated by a user, even the users that
have connected from the general-purpose terminals
10 43a, 43b can share the necessary images in the
course of a conference.

[0044]

Further, in each of the foregoing embodiments,
examples in which HTML and an HTTP server are used
15 as the means of supplying image data to the general-
purpose terminals 43a, 43b are described. However,
the present invention is not limited to such an
arrangement. Any method of supplying image data may
be utilized so long as it is one through which
20 hyperlinked multimedia data can be supplied.

[0045]

Further, in regard to the voice communication
protocol for voice communication with the general-
purpose terminals 43a, 43b, any protocol may be used
25 so long as it makes real-time communication
possible.

[0046]

<Other Embodiments>

The present invention can be applied to a system constituted by a plurality of devices (e.g., a host computer, interface, reader, printer, etc.) or to an apparatus comprising a single device (e.g., a copier or facsimile machine, etc.).

[0047]

Furthermore, it goes without saying that the object of the invention is attained also by supplying a storage medium storing the program codes of the software for performing the functions of the foregoing embodiments to a system or an apparatus, reading the program codes with a computer (e.g., a CPU or MPU) of the system or apparatus from the storage medium, and then executing the program codes.

[0048]

In this case, the program codes read from the storage medium implement the novel functions of the invention, and the storage medium storing the program codes constitutes the invention.

[0049]

Further, the storage medium, such as a floppy disk, hard disk, optical disk, magneto-optical disk, CD-ROM, CD-R, magnetic tape, non-volatile type memory card or ROM can be used to provide the program codes.

[0050]

Furthermore, besides the case where the aforesaid functions according to the embodiments are implemented by executing the program codes read by a computer, it goes without saying that the present invention covers a case where an operating system or the like running on the computer performs a part of or the entire process in accordance with the designation of program codes and implements the functions according to the embodiments.

[0051]

It goes without saying that the present invention further covers a case where, after the program codes read from the storage medium are written in a function extension board inserted into the computer or in a memory provided in a function extension unit connected to the computer, a CPU or the like contained in the function extension board or function extension unit performs a part of or the entire process in accordance with the designation of program codes and implements the function of the above embodiment.

[0052]

[EFFECT OF THE INVENTION]

In accordance with the present invention, as described above, a general-purpose terminal can

participate in a multipoint videoconferencing system in a simple manner.

[0053]

[BRIEF DESCRIPTION OF THE DRAWINGS]

5 [Fig. 1]

Fig. 1 is a block diagram illustrating a basic construction of a multipoint videoconferencing system according to an embodiment of the present invention.

10 [Fig. 2]

Fig. 2 is a block diagram illustrating a multipoint videoconferencing system according to the prior art.

[Fig. 3]

15 Fig. 3 is a block diagram showing the configuration of a multipoint videoconferencing system having a telephone-based gateway function according to the prior art.

[Fig. 4]

20 Fig. 4 is a block diagram illustrating the configuration of a multipoint videoconferencing system in this embodiment.

[Fig. 5]

25 Fig. 5 is a block diagram showing an example of the structure of HTML data in this embodiment.

[Fig. 6]

Fig. 6 is a block diagram showing the construction of a multipoint connection apparatus according to a second embodiment of the present invention.

5 [Fig. 7]

Fig. 7 is a block diagram showing the construction of a multipoint connection apparatus according to a third embodiment of the present invention.

10 [DESCRIPTION OF THE REFERENCE NUMBERS]

11a-11c, 20a, 20b NETWORK INTERFACE

12a-12c MULTIPLEXER/DEMULTIPLEXER

13 AUDIO PROCESSOR

14 IMAGE SWITCHING UNIT

15 15 DATA DISTRIBUTION UNIT

16 SYSTEM CONTROLLER

17 IMAGE CONVERTER

18 HTML DATA GENERATOR

19 HTTP SERVER

20 21 VOICE-COMMUNICATION PROTOCOL CONVERTER

22 VOICE RECOGNITION UNIT

23 VOICE SYNTHESIZER

41a-41d VIDEOCONFERENCING TERMINAL

42 MULTIPLEXER/DEMULTIPLEXER

25 43a, 43b GENERAL-PURPOSE TERMINAL